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ECS Project Training Material Volume 2: Problem Management

Technical Paper

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RESPONSIBLE ENGINEER

Ralph E. Fuller Date
EOSDIS Core System Project

SUBMITTED BY

Tom Hickey, M&O Deputy Manager Date
EOSDIS Core System Project

Hughes Information Technology Systems
Upper Marlboro, Maryland

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Abstract

This is Volume 2 of a series of 10 volumes containing the training material for the Pre-Release B Testbed of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS). This lesson provides a detailed description of the process required for submitting and updating trouble tickets as well as investigating problems and identifying and implementing solutions.

***Keywords**:* training, instructional, design, course, objective, problem, management, trouble, ticket, review, board, failure, DDTS.

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Contents

Problem Resolution

Preparing a Trouble Ticket Telecon and Processing a Trouble Ticket through the Failure Review Board

Practical Exercise

Slide Presentation

Figures

Introduction

Identification

Training Material Volume 2 is part of a series of Technical Papers that will be used to teach Maintenance and Operations (M&O) concepts to the M&O staff at the following Distributed Active Archive Centers (DAACs): Langley Research Center (LaRC), National Snow and Ice Data Center (NSIDC) and EROS Data Center (EDC). under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-6000).

Scope

Training Material Volume 2 describes the process and procedures by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented.. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

This document reflects the August 23, 1995 Technical Baseline maintained by the contractor Configuration Control Board (CCB) in accordance with ECS technical direction #11, dated December 6, 1994.

Purpose

The purpose of this Technical Paper is to provide a detailed course of instruction that forms the basis for understanding problem management. Lesson objectives are developed and will be used to guide the flow of instruction for this lesson. The lesson objectives will serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Organization

This document is organized as follows:

Introduction:	The Introduction presents the document identification, scope, purpose, and organization.
Student Guide:	The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics are included.
Slide Presentation:	Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson.

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Problem Management

Lesson Overview

This lesson will provide you with the complete process by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented.

Lesson Objectives

Overall Objective - The overall objective of the Problem Management lesson is for Science and Communications Maintenance and Operations (M&O) personnel to develop proficiency in the procedures that apply to the trouble ticketing/problem resolution process for the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS).

Condition - The student will be given a written description of an operational problem (affecting ECS hardware, software, documentation, or procedures) and access to the Trouble Ticketing System.

Standard - The student will use the Trouble Ticketing System without error in accordance with the prescribed process and procedures to submit, update and complete the specified parts of a trouble ticket.

Specific Objective 1 - The student will perform the steps involved in submitting a trouble ticket.

Condition - The student will be given a description of an operational problem to be reported through the Trouble Ticketing System and access to the Trouble Ticketing System (through a workstation or terminal).

Standard - The student will perform without error the steps involved in submitting a trouble ticket in accordance with the applicable procedure.

Specific Objective 2 - The student will perform the steps involved in making a change to an existing trouble ticket.

Condition - The student will be given a description of a change to be made to an existing trouble ticket and access to the Trouble Ticketing System (through a workstation or terminal).

Standard - The student will perform without error the steps involved in making a change to an existing trouble ticket in accordance with the applicable procedure.

Specific Objective 3 - The student will describe the general steps in the routine trouble ticket problem resolution process, including the differences that result from assignment of the various priority levels.

Condition - The student will be given a description of a routine operational problem to be resolved through the problem resolution process.

Standard - The student will state without error the general steps involved in the routine trouble ticket problem resolution process in accordance with the applicable procedure.

Specific Objective 4 - The student will describe the general steps in the process of preparing a Trouble Ticket Telecon and processing a trouble ticket through the Failure/Malfunction Review Board.

Condition - The student will be given a description of an operational problem to be processed through the Failure/Malfunction Review Board.

Standard - The student will state without error the general steps involved in the processing of an operational problem through the Failure/Malfunction Review Board in accordance with the applicable procedure.

Importance

This lesson applies to students who will be internal users or operators of the ECS (including support staff). The lesson will provide them with the knowledge and skills needed for submitting nonconformance reports (NCRs)/trouble tickets and making additional entries on trouble tickets in the course of investigating ECS problems reported on trouble tickets. They will need the knowledge and skills on the job when they encounter ECS hardware, software, documentation or procedural problems that they cannot readily fix, that affect other users/operators, or that are system-wide problems. The lesson describes why and how trouble tickets are submitted and updated. In addition, it describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented. Consequently, the students will become aware of what happens to the trouble tickets they submit and what they can expect in terms of feedback on their submittals.

Writing a Trouble Ticket (TT) or Problem Report

Purpose and Functions of Trouble Tickets

A trouble ticket (TT) or problem report is an electronic document that serves the following purposes:

- reporting/recording problems or system nonconformance with requirements.
- recording an idea for a system enhancement.

The problems reported most frequently affect the following ECS components:

- hardware.
- software.
- technical documents.
- procedures.

Problem reports that are used for recording an idea for a system enhancement are considered by the Sustaining Engineering organizations either at the Distributed Active Archive Centers (DAACs) or at the ECS Sustaining Engineering Organization (SEO).

Problem reports are submitted by:

- users in the science community.
- ECS operators.
- developers using ECS.

Problem reports for the Pre-Release B Testbed (hereinafter called the Testbed) use the NonConformance Report (NCR) system and have two possible states…

- open.
- closed.

A problem report or NCR is "open" (in process) until the problem has been resolved and the problem resolution has been officially approved. Then the problem report or NCR is "closed."

Problems which require changes that could have significant effects on the ECS configuration must be referred to the configuration management process. If the NCR investigation indicates that a configuration change is required to solve a problem or to develop an enhancement, the subject of the NCR becomes a configuration management issue and a Configuration Change Request (CCR) is prepared.

- A CCR provides documentation of the configuration management process by which changes to ECS configuration items (CIs) or configuration controlled items (i.e., components of CIs) are approved and implemented.

- A problem report (trouble ticket or NCR) leads to a CCR only when a configuration change is proposed.

The ECS Testbed Problem Reporting System provides a consistent means of…

- reporting Testbed problems or nonconformances.

- classifying problems.

- tracking the occurrence and resolution of problems.

The goals of the system are to facilitate both the identification and resolution of problems, to ensure that all nonconformances are recorded, and to ensure the rapid, easy disposition of NCRs. To facilitate disposition and resolution of problems, the system and its processes emphasize tracking of responsibility, effective communication, and delegation of authority.

Severity Levels

In the NCR process, the individual submitting the problem report/NCR assigns the initial severity level, which will be reviewed by the NCR Review Board during the screening process. The severity levels used are:

- *Severity Level 1: System cannot perform a critical function*. The defect presents immediate impact to development, integration testing, operation, services, or data processing; or results in loss of one or more essential mission objectives. No work around exists and the defect causes total failure of the software or unrecoverable data loss. **This defect is a show stopper.**

- *Severity Level 2: System substantially impaired*. This is a defect that causes substantially impaired functionality and impacts development, operations, or data functions, preventing the system from effectively or efficiently fulfilling baseline requirements. A work around may exist that allows testing to continue, but its use is unsatisfactory. **While not a show stopper, this defect is unacceptable.**

- *Severity Level 3: System slightly impaired*. This is a defect that causes slightly impaired functionality of the system and has only a slight impact on development, operations, service, or data processing functions. A satisfactory work around may exist.

- *Severity Level 4: Minor functional errors, typographical errors, and documentation errors*. This is a defect of minor significance, such as errors in documentation or incorrectly aligned icons on a GUI, or perhaps a GUI takes 3 seconds to appear on the screen and it should only take 2 seconds. A work around exists or, if not, the impairment is slight.

- *Severity Level 5: Minor enhancements and minor requests*. This category is used to record request for minor changes which are **NOT** specified in the requirements. Note: Enhancement requests which entail changes to Requirements will be closed in favor of a CCR. The NCR board may request the submitter to initiate the CCR, or the board may initiate the CCR.

For the Testbed, the Problem Reporting System is managed by a computer software package called the Distributed Defect Tracking System (DDTS). Figure 1 illustrates the main screen of this problem reporting tool, DDTS. This package has been customized by ECS to provide an accurate reflection of the process for resolution of NCRs. The result includes the following effects:

- Enforcing the progress of NCRs through the resolution process.
- Capturing necessary information to document the process.
- Production of management reports to foster management visibility and metrics to ensure that NCRs are being worked in a timely and effective manner.

The DDTS tool provides a distributed Problem Reporting System that furnishes ECS centers (e.g., Sustaining Engineering Organization [SEO], DAACs) with a common means of classifying, tracking, and reporting both the occurrence of problems and their resolution. The Problem Reporting System performs the following functions:

- Provides a graphical user interface (GUI) that provides operations personnel with access to the Problem Reporting System.
- Provides a common problem report/NCR entry format.
- Stores problem reports/NCRs.
- Retrieves problem reports/NCRs upon request.
- Produces stock and common reports on ECS problems.
- Defines a consistent “life cycle” (from submittal to completion) for problem reports.

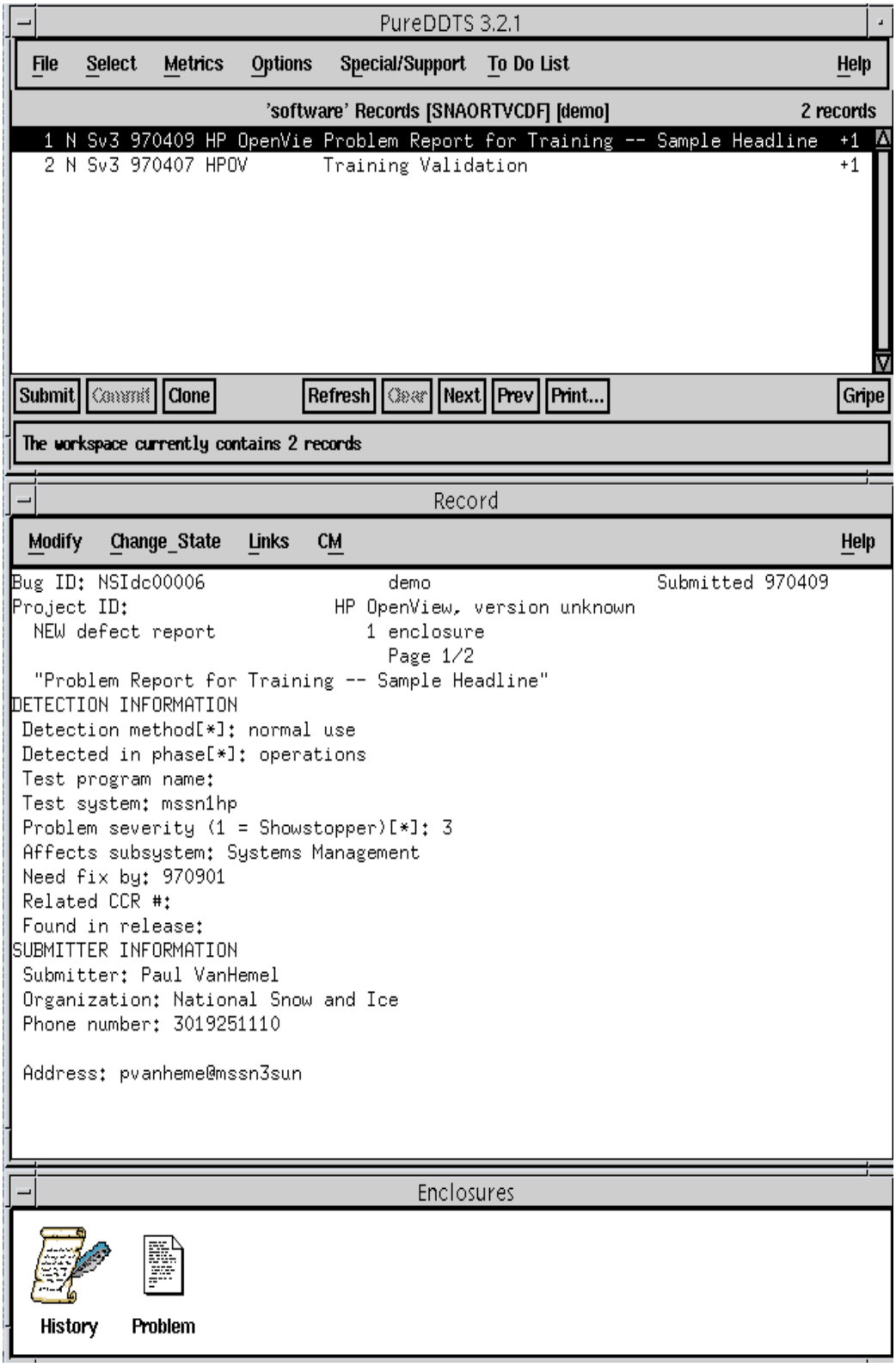

Figure 1. Problem Report (DDTS) Main Screen

Writing/Submitting Problem Reports (Trouble Tickets/NCRs)

This section describes the method by which maintenance and operations (M&O) personnel use DDTS to submit a problem report or NCR. The Problem Reporting System is wholly automated.

- Problem reports/NCRs are handled electronically.
  - — common distributed-access database system.
  - — DDTS is the problem report database tool.
- Supporting documentation for a problem report may be handled within DDTS.
  - — It is possible to attach a supporting documentation file in DDTS.
  - — Such supporting documentation in electronic form (e.g., computer files) is then available to the local Problem Reporting System database manager.
    - · Depending on the organization, either the CM Administrator or the Operations Readiness and Performance Assurance Analyst is the database manager for the Problem Reporting System.
    - · If any supplementary information in electronic form is sent separately, attach an e-mail message identifying the corresponding NCR number, submitter identification and any other relevant information.
  - — Supporting documentation **not** in electronic form (if any) is handled by the local Problem Reporting System database manager and is listed as an attachment to the problem report/NCR.

The procedure for writing and submitting a problem report or NCR is performed by any internal ECS user or operator who needs to submit a problem report to have an operating problem investigated. The procedure starts with the assumption that the user or operator has logged in to ECS.

1 On workstation **mss*x*3sun**, at the Unix prompt in a terminal window, in directory **/usr/ecs/Rel_A/COTS/ddts/bin**, type **xddts** and then press the **Enter** key.

- NOTE: The ***x*** in the workstation name will be a letter designating your site: **g** = GSFC, **l** = LaRC, **e** = EDC, and **n** = NSIDC (e.g., **mssn3sun** indicates the management services subsystem sun workstation at NSIDC). If you access the workstation through a remote login (rlogin), you must enter **xhost +** prior to the rlogin, and enter **setenv DISPLAY <local_workstation IP address>:0.0** after the rlogin before entering the **xddts** command.
- The **PureDDTS 3.2.1** window (top portion of the **Problem Report** main screen) is displayed.
- If this is the initial execution of DDTS, a default warning dialog box is displayed indicating that you do not have any defaults established yet.

2 Click on the **OK** button in the warning box.

- The warning box is dismissed.

3 Follow menu path **File→Submit New Record by Class**.

- A scrollable list box is displayed with available classes: **ALL**, **Change_Request**, **calls**, **company**, **hardware**, **issue**, **request**, **software**, **software.CP**, and **todo**. [NOTE: Some of these classes are provided by the vendor as part of DDTS. The product is customized for ECS; the customized classes are for a configuration management function (**Change_Request**) and the problem management function (**hardware** and **software**). There may be other customized classes added as the need arises (e.g., for refined compartmentalization within problem management).]

4 Scroll down the list (if necessary), click on **software** to highlight (select) it, and then click on the **OK** button.

- The **Record** window (middle portion of the **Problem Report** main screen) is displayed, with header **Submit a New Defect** and **software** displayed in the **Submit to which class of projects:** field.

5 Press the **Enter** key (NOTE: You may use the **Tab** key instead to progress through the fields).

- The cursor moves to the **Project Name** field.

6 Type a question mark (i.e., **?**) and then press the **Enter** key.

- A Help window appears directing the choice of one of the following projects: **DDTs**, **ECS_NCR_SW**, and **demo**.

7 Click on the **Done** button of the Help window, then type the **Project Name** of your choice from those that were listed (e.g., type **demo**), and press the **Enter** key.

- As an alternative, you may use the left mouse button to highlight your choice in the Help window, then click on the **Done** button, and then use the middle mouse button to paste that choice in the **Project Name:** field.
- For problems with Testbed software, use the **ECS_NCR_SW** choice. For this exercise, use the **demo** choice, which has been provided for training and practice.
- The **Record** window (middle portion of the **Problem Report** main screen) displays your choice (e.g., **demo**) as a header, and the cursor appears in the **Software:** field.

8 Type the name of the software package with which the problem deals, and then press the **Enter** key.

- For this exercise, use the name of one of the ECS COTS products (e.g., **HP OpenView**).
- The cursor moves to the **Version:** field (which appears when **Enter** is pressed).

9 Type **unknown** (or, if you know the version, you may type it), and then press the **Enter** key.

- The cursor moves to the **Headline:** field.

10 Type a one-line summary of the problem, and then press the **Enter** key.

- Try to make the problem clear by title. For this exercise, type **Problem report just for training**, or make up your own one-line summary.
- The cursor moves to the **Detection Method [*]:** field.

11 Press the **Enter** key.

- A selection box is displayed requesting the choice of **One of . . . normal use**, **functional test**, **system test**, **random unplanned test**, **regression test**, **other,see prob. encl.**.

12 Click on your selection to highlight it, and then click on the **OK** button.

- For this exercise, use the selection **normal use**.
- The selection box disappears and your selection is entered in the **Detection Method [*]:** field.
- The cursor moves to the **Detected in phase [*]:** field.

13 Press the **Enter** key.

- A selection box is displayed requesting the choice of **One of . . . system I&T**, **acceptance test**, **operations testing**, **IV&V**, **operations**.

14 Click on your selection to highlight it, and then click on the **OK** button.

- For this exercise, use the selection **operations**.
- The selection box disappears and your selection is entered in the **Detected in phase [*]:** field.
- The cursor moves to the **Test program name:** field.

15 Entry in this field is not mandatory, and it may be bypassed by just pressing the **Enter** key. If you were testing when the problem occurred, you may make an appropriate entry first.

- The cursor moves to the **Test system:** field.

16 Entry in this field is not mandatory, and it may be bypassed by just pressing the **Enter** key. However, it will be helpful to enter the name of the platform here – e.g., enter **mssn1hp** for the location of HP OpenView.

- The cursor moves to the **Severity (1 = Showstopper)[*]:** field, with a default entry of **3**.

17 If you do not wish to change the default severity (i.e., you wish to leave the default entry of **3**, just press the **Enter** key and go to step 19.

- The cursor moves to the **Affects Subsystem:** field.

18 If you wish to change the severity (i.e., you wish to select a severity level), use the **Backspace** key to remove the default entry, and then press the **Enter** key.

- A selection box is displayed requesting the choice of **One of . . . 1**, **2**, **3**, **4**, **5**.

19 Click on your selection to highlight it, and then click on the **OK** button.

- For this exercise, use the selection indicating severity level **3**.
- The selection box disappears and your selection is entered in the **Severity (1 = Showstopper)[*]:** field.
- The cursor moves to the **Affects Subsystem:** field.

20 Press the **Enter** key.

- A selection box is displayed requesting the choice of **One of . . . Client**, **Interoperability**, **Data Management**, **Data Server**, **Ingest**, **Planning**, **Data Processing**, **Communications**, **Systems Management**.

21 Click on your selection to highlight it, and then click on the **OK** button.

- For this exercise, use the selection indicating **Systems Management**.
- The selection box disappears and your selection is entered in the **Affects Subsystem:** field.
- The cursor moves to the **Need fix by:** field.

22 Type the date by which the fix for this NCR is needed, in the format **yymmdd**, and then press the **Enter** key.

- For this training exercise, use the date **970901**.
- The cursor moves to the **Related CCR#:** field.

23 Entry in this field is not mandatory, and it may be bypassed by just pressing the **Enter** key. If there is a related CCR that you know about, you may enter its CCR Number first.

- The cursor moves to the **Found in Release:** field.

24 Entry in this field is not mandatory, and it may be bypassed by just pressing the **Enter** key. You may make an entry (e.g., **Testbed**) first.

- The cursor moves to the **Phone number**: field.

25 Enter your phone number, including the area code, and then press the **Enter** key.

- The cursor moves to the **Do you want to be notified of changes to this defect?** field, with a default answer of **Y** supplied.

26 Press the **Enter** key.

- The cursor moves to the **Enhancement request?** field, with a default answer of **N** supplied.
- If you think this Problem Report is requesting an enhancement to the system, you may backspace and type **Y**.

27 Press the **Enter** key.

- A **Problem Window** appears, with the cursor placed at the beginning of an instruction stating **Please describe the problem you are experiencing below, including what you did, what you expected to happen, and what actually happened:**.

28 Press the **Down Arrow** key two or three times to put the cursor below the instruction. Then type a detailed description of the problem, including the name of the host on which you believe the problem happened.

- For this exercise, you may enter **Training description**, or make up a brief description of your own choosing.
- Notice that the **Problem Window** has a menu which permits following paths **File→Save Changes & Dismiss Editor**, **File→Insert File . . .**, or **File→Dismiss Editor**. If you choose to use another editor to create the problem description and save its file in the working directory, you can use path **File→Insert File . . .** here to insert the description in the **Problem Window**.

29 Follow menu path **File→Save Changes and Dismiss Editor** on the **Problem Window**.

- The **Problem Window** disappears and its contents are saved (although not yet committed to the data base!). The **Enclosures** window (bottom portion of the **Problem Report** main screen) is displayed, with a **History** icon and a **Problem** icon. You may double click on either of these icons. The **History** lists two events (submittal of the report and addition of the **Problem** enclosure). The **Problem** shows the problem description and permits editing of it.

30 Click on the **Commit** button in the **PureDDTS 3.2.1** window (top portion of the **Problem Report** main screen).

- The status line indicates **1 item committed to database**.

Documenting Changes

Reviewing and Modifying Problem Reports

Problem reports must be modified as the problem resolution process progresses and the various parties involved in the process have to make entries on the NCR, for example:

- assignment to a technician for problem resolution.
- resolution log entries.
- changes of status.
- forwarding to another site.

The changes are the result of better understanding of the nature of problems, proposed and revised solutions resulting from the investigation or NCR Review Board decisions. The understanding is developed through the work to resolve the problems, and changes in NCR status reflect progression toward ultimate resolution of the problem and closing of the NCR.

Access to problem report data is controlled by the system administrator or database manager for the Problem Reporting System. The system administrator or database manager assigns each user of DDTS certain access privileges.

- Access privileges determine which NCR fields (if any) you can modify.
- Examples:
  - — Some operators will be allowed only to submit problem reports.
  - — Operations Coordinator must be able to submit problem reports, modify report status, assign priority, assign the problem report to a specific investigator, and make many other modifications.

Reviewing and changing a Testbed problem report/NCR is accomplished using DDTS. Figure 2 illustrates how the main screen of the problem report tool might appear after a new problem report has been assigned for evaluation/analysis.

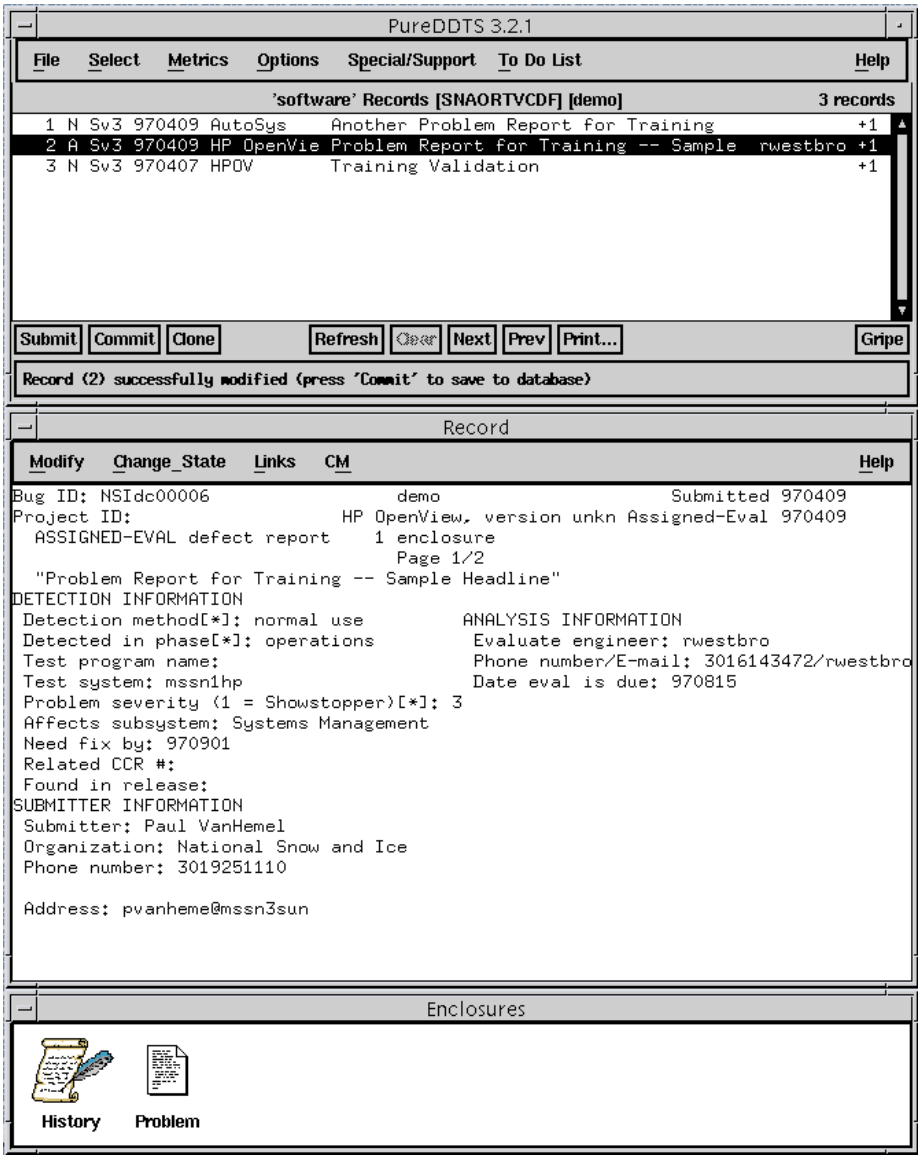

Figure 2. Problem Report Assign-Eval

For reviewing problem reports, it will be desirable to establish some defaults, so that each time you launch the DDTS tool it will display an index of the reports you are likely to use most often. This will preclude display of the initial message warning that you have not established defaults and instead load a selected index and display the first record upon launch of the tool. The basic steps of the procedure for establishing defaults are identified below.

Establishing Defaults for DDTS Problem Reporting Tool

1 On workstation **mss*x*3sun**, at the Unix prompt in a terminal window, in directory **/usr/ecs/Rel_A/COTS/ddts/bin**, type **xddts** and then press the **Enter** key.

- NOTE: The ***x*** in the workstation name will be a letter designating your site: **g** = GSFC, **l** = LaRC, **e** = EDC, and **n** = NSIDC (e.g., **mssn3sun** indicates the management services subsystem sun workstation at NSIDC). If you access the workstation through a remote login (rlogin), you must enter **xhost +** prior to the rlogin, and enter **setenv DISPLAY <local_workstation IP address>:0.0** after the rlogin before entering the **xddts** command.
- The **PureDDTS 3.2.1** window (top portion of the **Problem Report** main screen) is displayed.
- If this is the initial execution of DDTS, a default warning dialog box is displayed indicating that you do not have any defaults established yet.

2 Click on the **OK** button in the warning box.

- The warning box is dismissed.

3 Follow menu path **Select→Select Project, Class & State . . . .**

- A **Select Project, Class & State** dialog box is displayed, with a default (e.g., **software**) shown in the **Class Name** field.
- The **Projects** field displays **software** NCR projects (**DDTs**, **ECS_NCR_SW**, and **demo**).
- The **States** field displays **software** NCR states (**S Submit**, **N New**, **A Assign-Eval**, **O Assign-Fix**, **R Fix**, **T Assign-Verify**, **V Verify**, **C Close**, **D Duplicate**, **F Forward**).
- You will probably want your default display of problem reports to be those in the **software** class, and if so, you need not change the default class and can skip directly to **Step 6**.

4 If you want the default display to be hardware problems, or, if other classes have been set up (e.g., for Science Software Integration and Test) and you want those displayed, click on the **Change Class** button.

- A list box appears listing numerous possible **Class Name** choices.

5 Scroll down the list, click on the class you want (e.g., **hardware)** to highlight (select) it, and then click on the **OK** button.

- The list box disappears and the **Class Name** field displays your selected class.

6 Highlight (select) those projects in the **Projects** field for which you think you will usually want to see problem reports by holding down the **Shift** key while clicking on your choices. If you wish to see reports for all of the choices, you can highlight all of them by clicking on the **Select All** button under the **Projects** field.

- For this exercise, select **demo**. You can always come back and select other defaults later.

7 Highlight (select) those states in the **States** field for which you think you will usually want to see problem reports by holding down the **Shift** key while clicking on your choices. If you wish to see reports for all of the choices, you can highlight all of them by clicking on the **Select All** button under the **States** field.

- For this exercise, use the **Select All** button to highlight all states.

8 In the radio box on the left near the bottom left corner of the window, click on the **Submitted by** radio button or on the **Assigned to** radio button to choose whether you want reports displayed based on who submitted them or based on who they have been assigned to, respectively.

- For this exercise, select **Submitted by**.

9 In the radio box on the right near the bottom left corner of the window, click on the **Myself** radio button or on the **Users** radio button to choose whether you want reports displayed based on submission by/assignment to yourself or users, respectively.

- If you select **Myself**, the **Users' Names** field is grayed out and inactive. If you select **Users**, the **Users' Names** field may used to specify selected users.

- For this exercise, select **Users**.

10 Click on the **Save as Default** button at the bottom of the window.

- Your selections are saved and will be used to build an index of reports to be displayed whenever you launch the DDTS Problem Reporting tool.

To review or modify problem reports through DDTS, use the **Change_State** menu in the **Record** window of the tool. As an example, the NCR you created previously is stored in the data base as a **New** problem report (i.e., its **state** is **New**). To change its state from **New** to **Assign-Eval**, use the following procedure.

Reviewing and Modifying Open Problem Reports

1 If you have DDTS active and have the **Select Project, Class & State** window open (e.g., if you have just saved default selections), click on the **OK** button at the bottom of the window. Then go to Step 3. Otherwise, go to Step 2.

- The **Select Project, Class & State** window disappears, the index based on your selections is loaded into the **PureDDTS 3.2.1** window (top of the **Problem Report** main screen), and the **Record** window (middle of the **Problem Report** main screen) and **Enclosures** window (bottom of the **Problem Report** main screen) are displayed showing the first report listed (e.g., the one you created for **Demo**).

2 On workstation **mss*x*3sun**, at the Unix prompt in a terminal window, in directory **/usr/ecs/Rel_A/COTS/ddts/bin**, type **xddts** and then press the **Enter** key.

- NOTE: The ***x*** in the workstation name will be a letter designating your site: **g** = GSFC, **l** = LaRC, **e** = EDC, and **n** = NSIDC (e.g., **mssn3sun** indicates the management services subsystem sun workstation at NSIDC). If you access the workstation through a remote login (rlogin), you must enter **xhost +** prior to the rlogin, and enter **setenv DISPLAY <local_workstation IP address>:0.0** after the rlogin before entering the **xddts** command.

- The **PureDDTS 3.2.1** window (top portion of the **Problem Report** main screen) is displayed, the index based on your default selections is loaded into that window, and the **Record** window (middle of the **Problem Report** main screen) and **Enclosures** window (bottom of the **Problem Report** main screen) are displayed showing the first report listed.

3 In the **PureDDTS 3.2.1** window (top portion of the **Problem Report** main screen), double click on the identifier for the report you just created in **demo**.

- The **Record** window (middle of the **Problem Report** main screen) and **Enclosures** window (bottom of the **Problem Report** main screen) show details for the selected report.

4 In the **Record** window, follow menu path **Change_State→A Assign-Eval**.

- As work proceeds to resolve the problem report, its state may be changed several times. State options available through the **Change_State** menu at various times in the life of a problem report include **N New**, **A Assign-Eval**, **O Assign-Fix**, **R Fix**, **T Assign-Verify**, **V Verify**, **C Close**, **D Duplicate**, **F Forward**.

- **Analysis Information** entry fields are displayed in the **Record** window and the cursor is positioned at the **Evaluate Engineer:** field.

5 Type the **login name** of the evaluation engineer, and then press the **Enter** key.

- For this exercise, you may use the **login name** of a classmate, or use your own.
- The cursor moves to the **Phone number/E-mail:** field.

6 Type the **phone number**, including area code, followed by the **E-mail address** of the individual assigned to review the problem, and then press the **Enter** key.

- The cursor moves to the **Date eval is due:** field

7 Type the date by which the evaluation for this NCR is needed, in the format **yymmdd**, and then press the **Enter** key.

- For this training exercise, use the date **970801**.
- The status shown at the top of the **Record** window changes from **NEW** to **ASSIGN-EVAL**.
- The status change event may be seen in the history of the problem report by double-clicking on the **History** icon in the **Enclosures** window (bottom of main screen).

Problem Resolution

Overview of Problem Resolution

- Every problem report/NCR is logged into the DDTS database for record-keeping purposes.
- Each problem report/NCR is evaluated first at the local center to determine the severity of the problem and to assign on-site responsibility for investigating the problem.
- Problem reports that can be resolved locally are assigned and tracked at the local center.
- Matters of sufficient importance are escalated to the agenda of the trouble ticket teleconference (known as the "TT Telecon") for discussion and disposition.
  - — Sponsored by the Sustaining Engineering Organization (SEO).
  - — Held weekly.
  - — Functions as the ECS Failure/Malfunction Review Board (FRB).
  - — Participants discuss high-priority TTs and coordinate TT activities within the Maintenance and Operations (M&O) organization as well as with development, customer, and user organizations.

The TT Telecon and FRB review processes are the principal topics of a separate section of this lesson.

Problem Report Triage

The Operations Coordinator at each center assigns priorities to problem reports using a triage system of maintenance priorities. The triage system is based on the degree to which a problem will adversely affect mission success. The following factors are considered:

- Scope of the problem's effects (impact).
- Frequency of occurrence.
- Availability of an adequate work-around.

Problems can be classified into any of five categories, the first three of which are specified in the Performance Assurance Requirements document (*EOS Performance Assurance Requirements for ECS*, Goddard Space Flight Center (GSFC) 420-05-03). The following three categories are specified in the performance assurance requirements:

Category 1: System/Service cannot perform critical function or imposes major safety hazard. (Priority 1)

Presents an immediate impact to development, operations, services, or data processing functions; imposes major safety hazard to personnel, systems, or space mission resources; or results in loss of one or more essential mission objectives.

Category 2: System/Service substantially impaired. (Priority 2)

Substantially impacts development, operations, services, or data processing functions; fails to operate within critical performance specifications; or cannot effectively or efficiently fulfill baseline requirements.

Category 3: System/Service slightly impaired. (Priority 3)

Causes minor or no substantial impact to development, operations, services, or data processing functions. Support may be degraded, but mission can still be accomplished.

In addition, the SEO recognizes the following classifications:

Priority 4: Nuisance Problem.

The problem is minor, such as the arrangement of video screens, color, etc.

Priority 5: Closed Problem.

The issue is known and has a prior disposition.

Any problem report that meets the conditions of Category 1 is designated a "**Red Flag**" report. According to the performance assurance requirements, malfunctions most likely to be assigned Category-1 status are "those involving the command and control functions of the FOS or those that can result in inability to produce, or irretrievable loss of Essential Data Products."

The Problem Report tool (DDTS) uses five severity levels, as noted previously: 1) System cannot perform critical function; 2) System substantially impaired; 3) System slightly impaired; 4) Minor functional errors, typographical errors, and documentation errors; and 5) Minor enhancements and minor requests.

- Severity is initially assigned by the submitter of the problem report. Since submitters may not be experienced with the system, the severity level initially assigned may not always be correct. When each NCR is reviewed by the appropriate NCR Review Board during a meeting to screen NCRs, the severity level may be raised or lowered in accordance with a problem report triage system.

- Priorities are maintained by the Configuration Management (CM) Administrator.

- All Category-1/Severity-1 problems are escalated to the attention of the Government Failure/Malfunction Review Board (FRB).
    - require both Government and Contractor Project Manager approval for final close-out.
- Category-2 problems equate to a Severity 2 rating.
    - resolved by the local NCR Review Board.
    - resolution is sent to the attention of the FRB for "advice and acknowledgment."
- Remaining types of problems are assigned priorities at the discretion of the Operations Coordiantor.
- Severity 2 and lower-priority trouble tickets can often be handled locally unless they affect more than one site.
- Problems that affect multiple sites are forwarded to the SEO.

NCR Review Board

The NCR Review Board considers the problem and proposed solution for each problem report that is referred to it.

- The NCR Review Board may suggest, comment, reject, approve or otherwise recommend actions as the board deems appropriate (within the limits of its authority).
- If the resolution of a problem report involves a configuration change (as determined by the board), the NCR Review Board generates a CCR.
    - problem is entered into the Change Request Manager (DDTS is the tool used for this function also) and is directed through the configuration management process, including review by the Configuration Control Board.
- If the resolution of a problem report does not involve a configuration change and can be handled locally, the NCR Review Board issues implementing instructions.
- After the problem has been corrected and the fix has been verified through testing, the NCR Review Board orders the DDTS database manager to close the trouble ticket.

Failure/Malfunction Review Board (FRB)

As previously mentioned, the FRB meets via "TT Telecon." It has the following primary functions:

- review high-priority (Category-1) problem reports.
- acknowledge the NCR Review Board's response to Category-2 problems.
- coordinate problem reporting activities within M&O and with development, customer and user organizations.

This lesson includes a separate section on processing trouble tickets through the FRB.

Problem Resolution Process

The steps of the general problem resolution process are based on those depicted in the Maintenance & Operations Problem Management Concept. The steps provide an outline of an average **routine** problem report's life cycle.

Emergency fixes of problems that would prevent operation of the ECS (especially high-priority problems) may, under some circumstances, be made through a somewhat abbreviated process. However, proper follow-up procedures must be followed to ratify the emergency action.

Figure 3 illustrates the state transitions in the general problem resolution process. The steps of the process, indicated by the numbers in the figure, are identified below. The system has been configured to allow each site the flexibility to create a life cycle from this example which best fits the site's needs. The procedural steps for making or changing entries in the Problem Report Tool (DDTS) fields are described in the Documenting Changes section of this lesson.

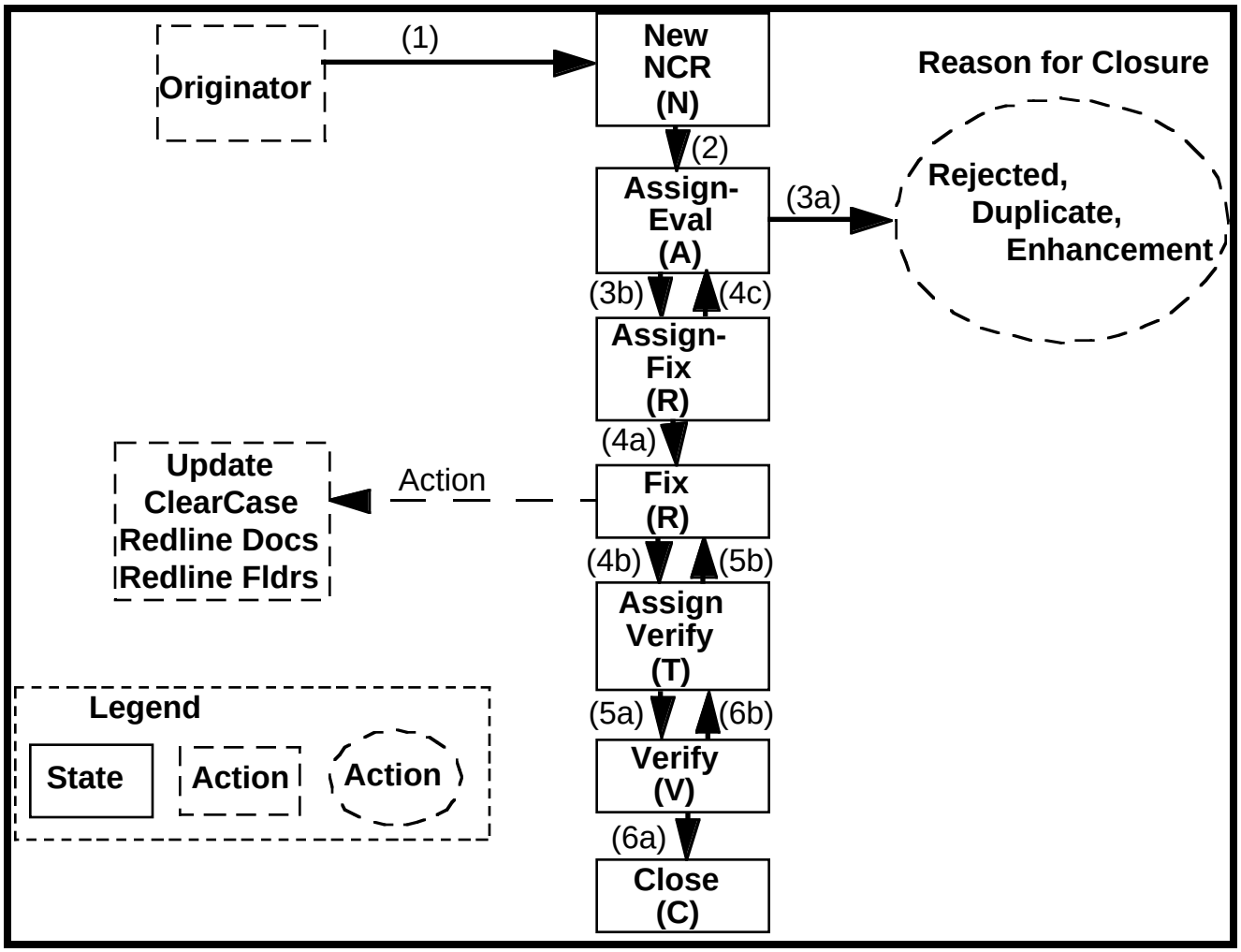

Figure 3. Problem Report State Transitions

1 An ECS user or operator discovers a problem with ECS hardware, software, procedures, or documentation and decides to document this problem for investigation and resolution. He/she submits a problem report/TT as described in the Writing a Trouble Ticket section of this lesson.

- The Problem Report Tool (DDTS) logs the problem report/TT into the system, assigns it a state of **New** field and notifies the Operations Coordinator that there is a new TT.

2 The NCR Review Board Chair or a responsible individual delegated by the Board assigns the problem report/TT for review. The state is changed to **Assign-Eval**.

3 Based on the review, the NCR Review Board takes one of two actions resulting in a change from **Assign-Eval** to a state of (a) **Close** or (b) **Assign-Fix**.

- The Board may **close** the problem report (Step 3a), citing a reason that the report is **rejected** (i.e., no defect exists and the report is in error), that it is a **duplicate** of an active report under review or other action, or that it is a request for **enhancement**, to allow the system to perform a function that is not required (if there is merit in the request, a recommendation may be forwarded to the User Requirements Data Base [URDB] system for further action, such as a CCR.

- The Board may determine that the problem report/TT is valid, confirm or modify its assigned severity level, and direct its transition to a state of **Assign-Fix** (Step 3b). Fields identifying where the problem occurred must be filled in, and the name of the fix assignee and the verifier must be entered. These personnel may be developers or responsible engineers from the SEO. As with all transitions, automatic e-mails are sent to all cognizant parties.

4 When work begins on the fix, there is a transition to the **Fix** state (Step 4a). An NCR in the **Fix** state remains in that state until the fix assignee has corrected the problem. When the defect is corrected, the Resolution enclosure field of the NCR (the free text field in DDTS used for complete explanations) is completed. The fixer must then initiate one or more of the actions shown in the dashed action block of Figure 3.

- If the fix is to software, the CM system check-in IDs, which are used in ClearCase®, must be entered to allow identification of the changed components. If the fix involves change to a controlled document, the document is red-lined and a Document Change Notice (DCN) must be filled out and the NCR number must be entered on the DCN. The DCN should also be referenced in the Enclosure free-text field of the NCR The developers' Software Development Notebook or Software Development File must be updated. Then the state of the NCR is changed to **Assign-Verify** by the fix assignee (Step 4b).

- If the fix assignee determines that the problem report/TT is in error, is a duplicate of another active NCR, or represents a request for an enhancement, he or she may present the evidence for the determination and ask for further review, returning the state to **Assign-Eval** (Step 4c).

5 The NCR Review Board normally assigns an individual responsible for the verification of the fix during the **Assign-Eval** state. This individual must be different from the fixer. If the problem report/TT was originally submitted by a tester, that tester is normally assigned the task of verification.

- When a verifier completes the task, there can be transition of the NCR to the **Verify** state (Step 5a) and the Board will be notified.

- If the fix cannot be verified, the problem report/TT is returned to the **Fix** state (Step 5b) by the verifier. Necessary changes to the information for that state are made in the Enclosure field of the Problem Report Tool (DDTS).

6 The verifier brings the results of verification to the next meeting of the NCR Review Board.

- The Board may then close the NCR and transition it to the **Close** state (Step 6a).

- If the Board requires further testing to determine that the problem is resolved, it may return the problem to the tester or someone else delegated for the testing, and transition the problem back to the **Assign-Verify** state (Step 6b).

Preparing a Trouble Ticket Telecon and Processing a Trouble Ticket through the Failure Review Board

The SEO and the site-level maintenance organization resolve routine maintenance issues at the system level and site level, respectively. The Failure/Malfunction Review Board (FRB) reviews and approves priority Category-1 issues and acknowledges the NCR Review Board's disposition of Category-2 problems.

Trouble Ticket Telecon

The FRB discusses Category-1 and -2 TTs at a weekly TT Telecon. By means of the teleconference the FRB coordinates TT activities within the M&O organization and with development, customer, and user organizations. Telecon attendees are listed in Figure 4.

A typical TT Telecon agenda is shown in Figure 5.

- Agenda items may be supplemented or replaced with hardcopy or softcopy reports.
- Material from the meeting is distributed within each ECS organization and to customer and user organizations as required.

Failure Review Board Close-Out

The FRB obtains the assistance of appropriate groups and personnel to ensure that the causes of all malfunctions are determined through proper investigation and analysis.

- may obtain assistance from system hardware suppliers if necessary.
- coordinates investigations and remedial actions with the appropriate project personnel from the National Aeronautics and Space Administration (NASA).
- assures proper documentation of investigations and remedial actions.
- ensures that configuration changes (if any) are made in accordance with the configuration management procedures.

The following conditions must be verified before a malfunction may be "closed out":

- Remedial and preventive actions have been completed on the item in which the malfunction occurred.
- All necessary preventive design changes to the item have been completed and verified through testing.
- Effective preventive actions have been established to prevent problems with other affected items (if any).

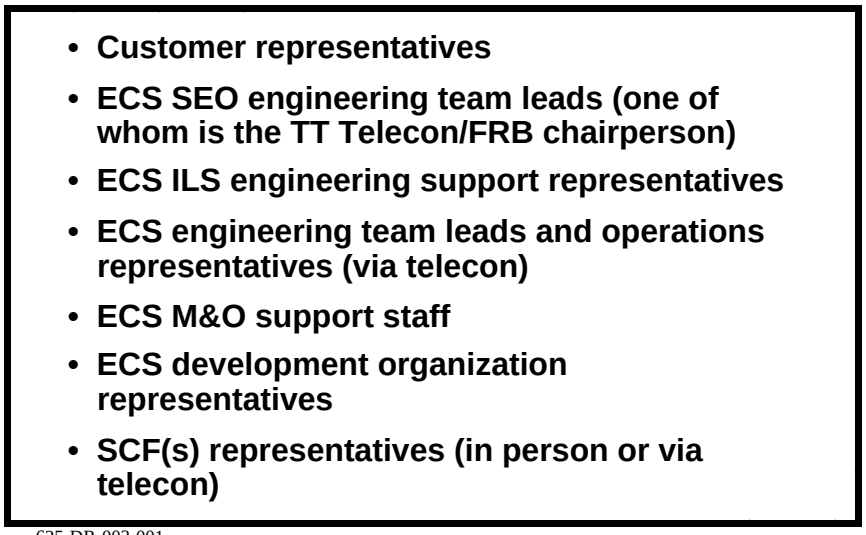

Figure 4. TT Telecon/FRB Attendees

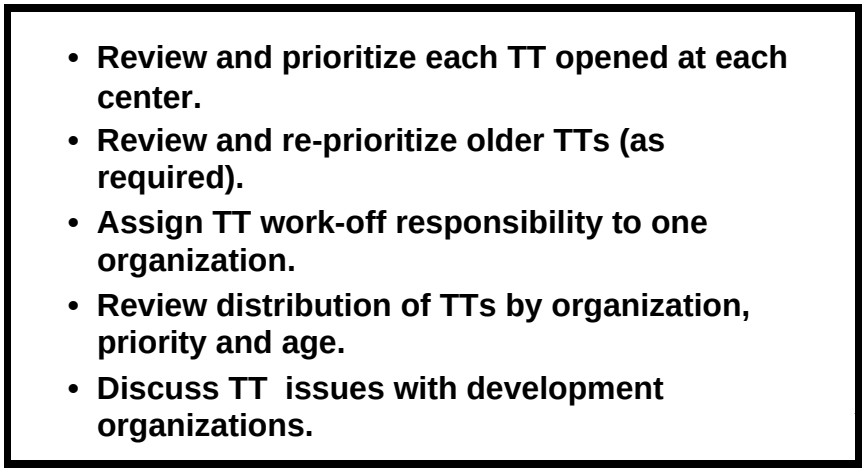

Figure 5. Typical Trouble Ticket Telecon Agenda

The FRB chairman (on behalf of the entire board) signs the close-out report before submitting it for NASA close-out. Malfunction reports are not considered “closed“ until signed by the authorized Government representative.

All "Red Flag" reports…

- are highlighted at the Government assurance reviews (e.g., Capabilities and Requirements Reviews, Release Readiness Reviews, Segment Operational Readiness Reviews).
- must have their resolution approved by both the contractor project manager and the Government EOS Project Manager before the issue can be officially closed.

Practical Exercise

Introduction

This exercise is intended to give the students practice in writing a trouble ticket, getting access to an existing trouble ticket and changing the information in trouble ticket data fields.

Equipment and Materials

One ECS workstation per student.

Writing a Trouble Ticket

The exercise involves the writing of a trouble ticket. The exercise begins with an operator becoming aware that a network is running too slowly. The operator prepares and submits a trouble ticket.

Perform the following steps:

1. Prepare a trouble ticket stating that the network is running too slowly. (Use the **demo** Project category.)
2. Submit the trouble ticket.

Documenting Trouble Ticket Changes

The exercise requires the student to locate a particular problem report/trouble ticket, make changes in trouble ticket fields, and have the changes applied to the problem report/trouble ticket.

Perform the following steps:

1. Display the **demo** problem report/trouble ticket you just created on the workstation screen.
2. Change the state of the problem report/trouble ticket from "New" to "Assign-Eval."
3. Assume the Review Board finds that there is no defect and the problem report is in error. Now change the state from "Assign-Eval" to "Closed." (Hint: You will need to go through some other states.) As DDTS forces intermediate steps, make entries in the Enclosure fields indicating that the problem is rejected and that the system meets requirements. (Hints: For Affected Subsystem, use **Systems Management**. For CSCI, use **Management Software**. For Problem Type and Recommended Change, use **Not a bug**.)

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Slide Presentation

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.